

WHAT IS CLAIMED IS

1. A peptide consisting of the  $\alpha$ D region or a subsequence of the  $\alpha$ D region of a protein kinase, wherein:

a) said peptide has between seven and about thirty amino acids or conservatively substituted functional amino acid analogs; and

b) said peptide modulates activity of the protein kinase with the provision that the peptide is not represented by MAHGDLKSYLRSLRPEAENNP (SEQ ID NO:171) or by KFDVINLA (SEQ ID NO:172).

2. The peptide of Claim 1 wherein the peptide is cyclic.

3. The peptide of Claim 1 wherein the peptide is linear.

4. The peptide of Claim 3 wherein the N-terminus and the C-terminus of the peptide are unsubstituted.

5. The peptide of Claim 3 wherein at least one of the N-terminus or the C-terminus is substituted.

6. The peptide of Claim 5 wherein the N-terminus is amidated and the C-terminus is acylated.

7. The peptide of Claim 3 wherein the peptide has an amino acid sequence corresponding to any subsequence of the amino acid sequence of said  $\alpha$ D region of said protein kinase,

with the proviso that any one amino acid in the sequence of the peptide can vary, being any amino acid that is a conservative substitution of the corresponding amino acid of said  $\alpha$ D region or conservatively substituted functional analog of the corresponding amino acid.

8. The peptide of Claim 3 wherein the protein kinase is member of a protein kinase family selected from the group of families consisting of G protein-coupled receptor kinases, cyclin dependent kinases, Src family kinases, endothelial growth factor receptor kinases, fibroblast growth factor receptor kinases, Tyk/Jak kinases, insulin receptor kinases, TGF $\beta$  receptor kinases, activin receptor-like kinases, neurotrophin receptor kinases, I-kappa B kinases, discoidin domain receptor kinases, and integrin-linked kinase.

9. The peptide of Claim 8 wherein the protein kinase is a G protein-coupled kinase selected from the group consisting of bARK1, bARK2, GRK1, GRK4, GRK5 and GRK6.

10. The peptide of Claim 8 wherein the protein kinase is a cyclin dependent kinase selected from the group consisting of CDK2, CDK4 and CDK6.

11. The peptide of Claim 8 wherein the protein kinase is a Src family kinase selected from the group consisting of c-Src, c-Yes, Fyn, C-Fgr, Lyn, Hck, Lck, Csk and Matk.

12. The peptide of Claim 8 wherein the protein kinase is an endothelial growth factor receptor kinase selected from the group consisting of Tie, Tek, PDGFR-b, PDGFR-a, Flt1, Flt4 and Flk1.

13. The peptide of Claim 8 wherein the protein kinase is a fibroblast growth factor receptor kinase selected from the group consisting of Flg, Bek, FGFR-3 and FGFR-4.

14. The peptide of Claim 8 wherein the protein kinase is a Tyk/Jak kinase selected from the group consisting of Jak1, Jak2, Jak3 and Tyk2.

15. The peptide of Claim 8 wherein the protein kinase is a discoidin domain receptor kinase selected from the group consisting of DDR1 and DDR2.

16. The peptide of Claim 8 wherein the protein kinase is a TGF $\beta$  receptor kinase selected from the group consisting of TGF $\beta$ RII, ACTRIIA and ACTRIIB.

17. The peptide of Claim 8 wherein the protein kinase is an activin receptor-like kinase selected from the group consisting of ALK1, ALK2, ALK3, ALK4, ALK5 and ALK6.

18. The peptide of Claim 8 wherein the protein kinase is a neurotrophin receptor kinase selected from the group consisting of Trk, TrkB, and TrkC.

19. The peptide of Claim 8 wherein the protein kinase is ILK.

20. The peptide of Claim 8 wherein the protein kinase is IRK.

21. The peptide of Claim 8 wherein protein kinase is an I-kappa B kinase selected from the group consisting of IKK-1 and IKK-2.

22. The peptide of Claim 3 wherein the peptide has an amino acid sequence corresponding to any subsequence of the amino acid sequence of said  $\alpha$ D region.

23. The peptide of Claim 3 wherein the peptide has the sequence of SEQ ID NO:95, SEQ ID NO:96, SEQ ID NO:97, SEQ ID NO:98, SEQ ID NO:99, SEQ ID NO:100, SEQ ID NO:101, SEQ ID NO:102, SEQ ID NO:103, SEQ ID NO:104, SEQ ID NO:105, SEQ ID NO:106, SEQ ID NO:107, SEQ ID NO:108, SEQ ID NO:109, SEQ ID NO:110, SEQ ID NO:111, SEQ ID NO:112, SEQ ID NO:113, SEQ ID NO:114, SEQ ID NO:115, SEQ ID NO:116, SEQ ID NO:117, SEQ ID NO:118, SEQ ID NO:119, SEQ ID NO:120, SEQ ID NO:121, SEQ ID NO:122, SEQ ID NO:123, SEQ ID NO:124, SEQ ID NO:125, SEQ ID NO:126, SEQ ID NO:127, SEQ ID NO:128, SEQ ID NO:129, SEQ ID NO:130, SEQ ID NO:131, SEQ ID NO:132, SEQ ID NO:133, SEQ ID NO:134, SEQ ID NO:135, SEQ ID NO:136, SEQ ID NO:137, SEQ ID NO:138, SEQ ID NO:139, SEQ ID NO:140, SEQ ID NO:141, SEQ ID NO:142, SEQ ID NO:143, SEQ ID NO:144, SEQ ID NO:145, SEQ ID NO:146, SEQ ID NO:147, SEQ ID NO:148, SEQ ID NO:149, SEQ ID NO:150, SEQ ID NO:151, SEQ ID NO:152, SEQ ID NO:153, SEQ ID

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NO:154, SEQ ID NO:155, SEQ ID NO:156, SEQ ID NO:157, SEQ ID  
NO:158, SEQ ID NO:159, SEQ ID NO:160, SEQ ID NO:161, SEQ ID  
NO:162, SEQ ID NO:163, SEQ ID NO:164, SEQ ID NO:165, SEQ ID  
NO:166, SEQ ID NO:167, SEQ ID NO:168, SEQ ID NO:169, or SEQ ID  
NO:170

24. A peptide having the sequence of SEQ ID NO:95,  
SEQ ID NO:96, SEQ ID NO:97, SEQ ID NO:98, SEQ ID NO:99, SEQ ID  
NO:100, SEQ ID NO:101, SEQ ID NO:102, SEQ ID NO:103, SEQ ID  
NO:104, SEQ ID NO:105, SEQ ID NO:106, SEQ ID NO:107, SEQ ID  
NO:108, SEQ ID NO:109, SEQ ID NO:110, SEQ ID NO:111, SEQ ID  
NO:112, SEQ ID NO:113, SEQ ID NO:114, SEQ ID NO:115, SEQ ID  
NO:116, SEQ ID NO:117, SEQ ID NO:118, SEQ ID NO:119, SEQ ID  
NO:120, SEQ ID NO:121, SEQ ID NO:122, SEQ ID NO:123, SEQ ID  
NO:124, SEQ ID NO:125, SEQ ID NO:126, SEQ ID NO:127, SEQ ED  
NO:128, SEQ ID NO:129, SEQ ID NO:130, SEQ ID NO:131, SEQ ID  
NO:132, SEQ ID NO:133, SEQ ID NO:134, SEQ ID NO:135, SEQ ID  
NO:136, SEQ ID NO:137, SEQ ID NO:138, SEQ ID NO:139, SEQ ID  
NO:140, SEQ ID NO:141, SEQ ID NO:142, SEQ ID NO:143, SEQ ID  
NO:144, SEQ ID NO:145, SEQ ID NO:146, SEQ ID NO:147, SEQ ID  
NO:148, SEQ ID NO:149, SEQ ID NO:150, SEQ ID NO:151, SEQ ID  
NO:152, SEQ ID NO:153, SEQ ID NO:154, SEQ ID NO:155, SEQ ID  
NO:156, SEQ ID NO:157, SEQ ID NO:158, SEQ ID NO:159, SEQ ID  
NO:160, SEQ ID NO:161, SEQ ID NO:162, SEQ ID NO:163, SEQ ID  
NO:164, SEQ ID NO:165, SEQ ID NO:166, SEQ ID NO:167, SEQ ID

NO:168, SEQ ID NO:169, or SEQ ID NO:170, with the proviso that any one amino acid residue in the peptide can vary, being any naturally occurring amino acid or conservatively substituted functional analog thereof.

25. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>23</sub> or a subsequence thereof comprising at least five amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of leucine, methionine, isoleucine and valine;

AA<sub>2</sub> is selected from the group consisting of aspartic acid, threonine, glutamic acid, serine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of a glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>4</sub> is selected from the group consisting of methionine, isoleucine, leucine and valine;

AA<sub>5</sub> is selected from the group consisting of asparagine and glutamine;

AA<sub>6</sub> is selected from the group consisting of glycine and alanine;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of a glutamic acid or aspartic acid;

AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of histidine, arginine and lysine;

AA<sub>11</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>12</sub> is histidine;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of serine, tyrosine, threonine, phenylalanine and tryptophan;

AA<sub>15</sub> is selected from the group consisting of glutamine, asparagine and histidine;

AA<sub>16</sub> is selected from the group consisting of histidine, valine, leucine, methionine and isoleucine;

AA<sub>17</sub> is selected from the group consisting of glycine, aspartic acid, glutamic acid, alanine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of a glutamic acid or aspartic acid;

AA<sub>18</sub> is selected from the group consisting of valine, glutamic acid, asparagine, glutamine, isoleucine, leucine, methionine, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of a glutamic acid or aspartic acid;

AA<sub>19</sub> is selected from the group consisting of pheynylalanine, aspartic acid, proline, alanine, tryptophan, tyrosine, glutamic acid, glycine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of a glutamic acid or aspartic acid;

AA<sub>20</sub> is selected from the group consisting of asparagine, glycine, glutamine and alanine;

AA<sub>21</sub> is selected from the group consisting of proline, phenylalanine, tryptophan and tyrosine;

AA<sub>22</sub> is selected from the group consisting of glycine and alanine; and

AA<sub>23</sub> is selected from the group consisting of phenylalanine, tryptophan and tyrosine.

26. The peptide of Claim 25 wherein the sequence AA<sub>1</sub> through AA<sub>23</sub> or a subsequence thereof corresponds to a sequence of the  $\alpha$ D region of a G protein-coupled receptor kinase selected from the group consisting of SEQ ID NO:18, SEQ ID NO:19, SEQ ID NO:20, SEQ ID NO:21 and SEQ ID NO:22 or a subsequence thereof, with the proviso that any two amino acids



in the sequence AA<sub>1</sub> through AA<sub>23</sub> or the subsequence thereof can vary as set forth in Claim 25.

27. The peptide of Claim 25 wherein the sequence AA<sub>1</sub> through AA<sub>23</sub> or a subsequence thereof corresponds to the sequence or a subsequence of the  $\alpha$ D region of a G protein-coupled receptor kinase selected from the group consisting of SEQ ID NO:18, SEQ ID NO:19, SEQ ID NO:20, SEQ ID NO:21 and SEQ ID NO:22, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>23</sub> or the subsequence thereof can vary as set forth in Claim 25.

28. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof comprising at least seven amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of phenylalanine, tryptophan and tyrosine;

AA<sub>2</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of phenylalanine, histidine, tryptophan and tyrosine;

AA<sub>4</sub> is selected from the group consisting of leucine, valine, isoleucine and methionine;

AA<sub>5</sub> is selected from the group consisting of histidine, aspartic acid, glutamic acid, and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>6</sub> is selected from the group consisting of glutamine and asparagine;

AA<sub>7</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>8</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>9</sub> is selected from the group consisting of lysine, arginine, threonine and serine;

AA<sub>10</sub> is selected from the group consisting of lysine, threonine, arginine and serine;

AA<sub>11</sub> is selected from the group consisting of phenylalanine, tyrosine and tryptophan;

AA<sub>12</sub> is selected from the group consisting of methionine, leucine, isoleucine and valine;

AA<sub>13</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>14</sub> is selected from the group consisting of alanine, lysine, arginine and glycine;

AA<sub>15</sub> is selected from the group consisting of valine, serine, alanine, isoleucine, leucine, methionine and threonine;

AA<sub>16</sub> is selected from the group consisting of alanine, proline and glycine;

AA<sub>17</sub> is selected from the group consisting of leucine, proline, glutamic acid, isoleucine, methionine, valine, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>18</sub> is selected from the group consisting of threonine, proline and serine;

AA<sub>19</sub> is selected from the group consisting of glycine and alanine; and

AA<sub>20</sub> is selected from the group consisting of isoleucine, leucine, valine and methionine.

29. The peptide of Claim 28 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof corresponds to a sequence of the  $\alpha$ D region of a cyclin dependent kinase selected from the group consisting of SEQ ID NO:35, SEQ ID NO:36 and SEQ ID NO:37 or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through

AA<sub>20</sub> or the subsequence thereof can vary as set forth in Claim 28.

30. The peptide of Claim 28 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof corresponds to a sequence of the  $\alpha$ D region of a cyclin dependent kinase selected from the group consisting of SEQ ID NO:35, SEQ ID NO:36 and SEQ ID NO:37 or a subsequence thereof, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary as set forth in Claim 28.

31. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>21</sub> or a subsequence thereof comprising at least seven amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of threonine, methionine, serine, isoleucine, leucine and valine;

AA<sub>2</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of phenylalanine, tyrosine, histidine and tryptophan;

AA<sub>4</sub> is selected from the group consisting of methionine, valine, isoleucine and leucine;

AA<sub>5</sub> is selected from the group consisting of serine, asparagine, cysteine, alanine, glutamic acid, threonine,

glutamine, aspartic acid, glycine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>6</sub> is selected from the group consisting of lysine, histidine, asparagine, arginine and glutamine;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of serine, asparagine, threonine and glutamine;

AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of leucine, valine, isoleucine and methionine;

AA<sub>11</sub> is selected from the group consisting of aspartic acid, asparagine, glutamic acid, glutamine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>12</sub> is selected from the group consisting of phenylalanine, tyrosine and tryptophan;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of lysine and arginine;

AA<sub>15</sub> is selected from the group consisting of glycine, glutamic acid, aspartic acid, asparagine, serine, threonine, glutamine, alanine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>16</sub> is selected from the group consisting of glutamic acid, glycine, proline, aspartic acid, arginine, lysine, alanine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>17</sub> is selected from the group consisting of threonine, serine, aspartic acid, glutamic acid, glycine, alanine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>18</sub> is selected from the group consisting of glycine, arginine, lysine and alanine;

AA<sub>19</sub> is selected from the group consisting of lysine, arginine, glutamine, glycine, serine, isoleucine, alanine, asparagine, threonine, leucine, methionine and valine;

AA<sub>20</sub> is selected from the group consisting of tyrosine, alanine, aspartic acid, lysine, valine, leucine, phenylalanine, tryptophan, glutamic acid, arginine, isoleucine, methionine, glycine and an aliphatic, substituted

aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid; and

AA<sub>21</sub> is selected from the group consisting of leucine, valine, glutamine, isoleucine, methionine and asparagine.

32. The peptide of Claim 31 wherein the sequence AA<sub>1</sub> through AA<sub>21</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of a Src family kinase selected from the group consisting of SEQ ID NO:38, SEQ ID NO:39, SEQ ID NO:40, SEQ ID NO:41, SEQ ID NO:42, SEQ ID NO:43, SEQ ID NO:44, SEQ ID NO:45 and SEQ ID NO:46 or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>21</sub> or the subsequence thereof can vary as set forth in Claim 31.

33. The peptide of Claim 31 wherein the sequence AA<sub>1</sub> through AA<sub>21</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of a Src family kinase selected from the group consisting of SEQ ID NO:38, SEQ ID NO:39, SEQ ID NO:40, SEQ ID NO:41, SEQ ID NO:42, SEQ ID NO:43, SEQ ID NO:44, SEQ ID NO:45 and SEQ ID NO:46 or a subsequence thereof, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>21</sub> or the subsequence thereof can vary as set forth in Claim 31.

34. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>39</sub> or a subsequence thereof comprising at least seven amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of isoleucine, threonine, valine, leucine, methionine and serine;

AA<sub>2</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>4</sub> is selected from the group consisting of alanine, cysteine, serine, threonine and glycine;

AA<sub>5</sub> is selected from the group consisting of glycine, arginine, phenylalanine, lysine, tryptophan and tyrosine;

AA<sub>6</sub> is selected from the group consisting of tyrosine, histidine, phenylalanine and tryptophan;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of asparagine, aspartic acid, glutamine, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;



AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of leucine, valine, serine, isoleucine, methionine and threonine;

AA<sub>11</sub> is selected from the group consisting of aspartic acid, asparagine, threonine, glutamic acid, glutamine, serine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>12</sub> is selected from the group consisting of phenylalanine, tyrosine and tryptophan;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of arginine, histidine and lysine;

AA<sub>15</sub> is selected from the group consisting of lysine, arginine, serine, alanine, glycine and threonine;

AA<sub>16</sub> is selected from the group consisting of serine, asparagine, lysine, threonine, glutamine and arginine;

AA<sub>17</sub> is selected from the group consisting of arginine and lysine;

AA<sub>18</sub> is selected from the group consisting of valine, histidine, aspartic acid, asparagine, isoleucine, leucine, methionine, glutamic acid, glutamine and an aliphatic,

substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>19</sub> is selected from the group consisting of leucine, threonine, serine, alanine, glutamic acid, isoleucine, methionine, valine, aspartic acid, glycine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>20</sub> is selected from the group consisting of glutamic acid, phenylalanine, aspartic acid, tryptophan, tyrosine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>21</sub> is selected from the group consisting of threonine, leucine, phenylalanine, serine, valine, isoleucine, methionine, tryptophan and tyrosine;

AA<sub>22</sub> is selected from the group consisting of aspartic acid, glutamine, serine, leucine, proline, glutamic acid, asparagine, threonine, isoleucine, methionine, valine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>23</sub> is selected from the group consisting of proline, histidine, asparagine, cysteine, tyrosine, glutamine, phenylalanine, tryptophan, and serine;

AA<sub>24</sub> is selected from the group consisting of alanine, histidine, lysine, arginine and glycine;

AA<sub>25</sub> is selected from the group consisting of phenylalanine, serine, proline, aspartic acid, glutamic acid, tryptophan, tyrosine, threonine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>26</sub> is selected from the group consisting of alanine, aspartic acid, glutamic acid, lysine, arginine, glycine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>27</sub> is selected from the group consisting of arginine, isoleucine, lysine, alanine, serine, glycine, leucine, methionine, valine and threonine;

AA<sub>28</sub> is selected from the group consisting of glutamic acid, alanine, arginine, proline, leucine, aspartic acid, lysine, isoleucine, methionine, valine, glycine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>29</sub> is selected from the group consisting of histidine, asparagine, arginine, lysine, glutamic acid, glutamine, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>30</sub> is selected from the group consisting of glycine, serine, proline, lysine, methionine, glutamine, phenylalanine, threonine, arginine, isoleucine, leucine, valine, asparagine, tryptophan, tyrosine and alanine;

AA<sub>31</sub> is selected from the group consisting of threonine, proline, glutamic acid, arginine, serine, aspartic acid, lysine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>32</sub> is selected from the group consisting of serine, alanine, aspartic acid, lysine, arginine, glycine, threonine, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>33</sub> is selected from the group consisting of threonine, glutamic acid, isoleucine, lysine, phenylalanine, serine, aspartic acid, leucine, methionine, valine, arginine, tryptophan, tyrosine and an aliphatic, substituted aliphatic,

benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>34</sub> is selected from the group consisting of leucine, phenylalanine, glutamic acid, arginine, aspartic acid, isoleucine, methionine, valine, tryptophan, tyrosine, lysine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>35</sub> is selected from the group consisting of tyrosine, glycine, lysine, alanine, phenylalanine, tryptophan and arginine;

AA<sub>36</sub> is selected from the group consisting of serine, leucine, methionine, valine, threonine, and isoleucine;

AA<sub>37</sub> is selected from the group consisting of asparagine, glutamic acid, valine, glycine, glutamine, aspartic acid, isoleucine, leucine, methionine, alanine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>38</sub> is selected from the group consisting of alanine, proline, glutamic acid, aspartic acid, glycine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>39</sub> is selected from the group consisting of leucine, alanine, glycine, isoleuine, methionine and valine.

35. The peptide of Claim 34, wherein the sequence AA<sub>1</sub> through AA<sub>39</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of an endothelial growth factor receptor kinase selected from the group consisting of SEQ ID NO:49, SEQ ID NO:50, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, SEQ ID NO:58 and SEQ ID NO:59 or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>39</sub> or the subsequence thereof can vary as set forth in Claim 34.

36. The peptide of Claim 34 wherein the sequence AA<sub>1</sub> through AA<sub>39</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of an endothelial growth factor receptor kinase selected from the group consisting of SEQ ID NO:49, SEQ ID NO:50, SEQ ID NO:55, SEQ ID NO:56, SEQ ID NO:57, SEQ ID NO:58 and SEQ ID NO:59 or a subsequence thereof, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>39</sub> or the subsequence thereof can vary as set forth in Claim 34.

37. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>34</sub> or a subsequence thereof comprising at least seven amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of valine, isoleucine, leucine and methionine;

AA<sub>2</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of tyrosine, cysteine, phenylalanine, tryptophan and serine;

AA<sub>4</sub> is selected from the group consisting of alanine and glycine;

AA<sub>5</sub> is selected from the group consisting of serine, alanine, threonine and glycine;

AA<sub>6</sub> is selected from the group consisting of lysine and arginine;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of asparagine and glutamine;

AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of arginine and lysine;

AA<sub>11</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted

aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>12</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of glutamine, arginine, asparagine and lysine;

AA<sub>15</sub> is selected from the group consisting of alanine and glycine;

AA<sub>16</sub> is selected from the group consisting of arginine and lysine;

AA<sub>17</sub> is selected from the group consisting of arginine and lysine;

AA<sub>18</sub> is proline;

AA<sub>19</sub> is proline;

AA<sub>20</sub> is selected from the group consisting of glycine and alanine;

AA<sub>21</sub> is selected from the group consisting of leucine, methionine, proline, isoleucine and valine;

AA<sub>22</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;



AA<sub>23</sub> is selected from the group consisting of tyrosine, leucine, phenylalanine, tryptophan, isoleucine, methionine and valine;

AA<sub>24</sub> is selected from the group consisting of cysteine, serine and threonine;

AA<sub>25</sub> is selected from the group consisting of tyrosine, phenylalanine, proline and tryptophan;

AA<sub>26</sub> is selected from the group consisting of asparagine, aspartic acid, glutamine, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>27</sub> is selected from the group consisting of proline, isoleucine, threonine, glycine, leucine, methionine, valine, serine and alanine;

AA<sub>28</sub> is selected from the group consisting of serine, asparagine, cysteine, proline, threonine and glutamine;

AA<sub>29</sub> is selected from the group consisting of histidine, arginine and lysine;

AA<sub>30</sub> is selected from the group consisting of asparagine, valine, proline, serine, glutamine, isoleucine, leucine, methionine and threonine;

AA<sub>31</sub> is selected from the group consisting of proline, serine and threonine;

AA<sub>32</sub> is selected from the group consisting of glutamic acid, glycine, aspartic acid, alanine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>33</sub> is selected from the group consisting of glutamine, proline and asparagine; and

AA<sub>34</sub> is selected from the group consisting of leucine, methionine, isoleucine and valine.

38. The peptide of Claim 37 wherein the sequence AA<sub>1</sub> through AA<sub>34</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of a fibroblast growth factor receptor kinase selected from the group consisting of SEQ ID NO:51, SEQ ID NO:52, SEQ ID NO:53 and SEQ ID NO:54 or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>34</sub> or the subsequence thereof can vary as set forth in Claim 37.

39. The peptide of Claim 37 wherein the sequence AA<sub>1</sub> through AA<sub>34</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of a fibroblast growth factor receptor kinase selected from the group consisting of SEQ ID NO:51, SEQ ID NO:52, SEQ ID NO:53 and SEQ ID NO:54 or a subsequence thereof, with the proviso that any one amino acid

in the sequence AA<sub>1</sub> through AA<sub>34</sub> or the subsequence thereof can vary as set forth in Claim 37.

40. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof comprising at least five amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of methionine, isoleucine, leucine and valine;

AA<sub>2</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of phenylalanine, tyrosine, and tryptophan;

AA<sub>4</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>5</sub> is proline;

AA<sub>6</sub> is selected from the group consisting of serine, tyrosine, threonine, phenylalanine, tryptophan, leucine and isoleucine;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of serine, cysteine and threonine;

AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of lysine and arginine;

AA<sub>11</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>12</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of proline, glutamine, and asparagine;

AA<sub>15</sub> is selected from the group consisting of lysine and arginine;

AA<sub>16</sub> is selected from the group consisting of asparagine, histidine and glutamine;

AA<sub>17</sub> is selected from the group consisting of lysine, arginine, serine and threonine;

AA<sub>18</sub> is selected from the group consisting of asparagine, glutamic acid, alanine, glutamine, aspartic acid, glycine, isoleucine, leucine and an aliphatic, substituted

aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>19</sub> is selected from the group consisting of lysine and arginine; and

AA<sub>20</sub> is selected from the group consisting of isoleucine, leucine, methionine and valine.

41. The peptide of Claim 40 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of a Tyk/Jak kinase selected from the group consisting of SEQ ID NO:73, SEQ ID NO:74, SEQ ID NO:75 and SEQ ID NO:76 or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary as set forth in Claim 40.

42. The peptide of Claim 40 wherein the sequence AA<sub>1</sub> through AA<sub>20</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ Dregion of a Tyk/Jak kinase selected from the group consisting of SEQ ID NO:73, SEQ ID NO:74, SEQ ID NO:75 and SEQ ID NO:76 or a subsequence thereof, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>20</sub> or the subsequence thereof can vary as set forth in Claim 40.

43. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>31</sub> or a subsequence thereof comprising at least five amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of methionine, isoleucine, leucine and valine;

AA<sub>2</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>4</sub> is selected from the group consisting of methionine, isoleucine, leucine and valine;

AA<sub>5</sub> is selected from the group consisting of alanine and glycine;

AA<sub>6</sub> is histidine;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of lysine and arginine;

AA<sub>11</sub> is selected from the group consisting of serine and threonine;

AA<sub>12</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of arginine and lysine;

AA<sub>15</sub> is selected from the group consisting of serine and threonine;

AA<sub>16</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>17</sub> is selected from the group consisting of arginine and lysine;

AA<sub>18</sub> is proline;

AA<sub>19</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>20</sub> is selected from the group consisting of alanine and glycine;

AA<sub>21</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted

aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>22</sub> is selected from the group consisting of asparagine and glutamine;

AA<sub>23</sub> is selected from the group consisting of asparagine and glutamine;

AA<sub>24</sub> is proline;

AA<sub>25</sub> is selected from the group consisting of glycine and alanine;

AA<sub>26</sub> is selected from the group consisting of arginine and lysine;

AA<sub>27</sub> is proline;

AA<sub>28</sub> is proline;

AA<sub>29</sub> is proline;

AA<sub>30</sub> is selected from the group consisting of threonine and serine; and

AA<sub>31</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine, with the proviso that the peptide is not represented by the sequence MAHGDLKSYLRSLRPEAENNP (SEQ ID NO:171).

44. The peptide of Claim 43 wherein the sequence AA<sub>1</sub> through AA<sub>31</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of SEQ ID NO:82 or a subsequence thereof, with the proviso that any two amino acids in the



sequence AA<sub>1</sub> through AA<sub>31</sub> or the subsequence thereof can vary as set forth in Claim 43.

45. The peptide of Claim 43 wherein the sequence AA<sub>1</sub> through AA<sub>31</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of SEQ ID NO:82 or a subsequence thereof, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>31</sub> or the subsequence thereof can vary as set forth in Claim 43.

46. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>18</sub> or a subsequence thereof comprising at least seven amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of threonine and serine;

AA<sub>2</sub> is selected from the group consisting of alanine and glycine;

AA<sub>3</sub> is selected from the group consisting of phenylalanine, tryptophan and tyrosine;

AA<sub>4</sub> is histidine;

AA<sub>5</sub> is selected from the group consisting of alanine, glutamic acid, aspartic acid, glycine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>6</sub> is selected from the group consisting of lysine and arginine;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of asparagine, serine, glutamine and threonine;

AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of glutamine, serine and threonine;

AA<sub>11</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>12</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of threonine, lysine, serine and arginine;

AA<sub>15</sub> is selected from the group consisting of arginine, alanine, glycine and lysine;

AA<sub>16</sub> is selected from the group consisting of histidine, asparagine and glutamine;

AA<sub>17</sub> is selected from the group consisting of valine, isoleucine, leucine and methionine; and

AA<sub>18</sub> is selected from the group consisting of isoleucine, valine, leucine and methionine.

47. The peptide of Claim 46 wherein the sequence AA<sub>1</sub> through AA<sub>18</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of a TGF $\beta$  receptor kinase selected from the group consisting of SEQ ID NO:83, SEQ ID NO:84 and SEQ ID NO:85 or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>18</sub> or the subsequence thereof can vary as set forth in Claim 46.

48. The peptide of Claim 46 wherein the sequence AA<sub>1</sub> through AA<sub>18</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of a TGF $\beta$  receptor kinase selected from the group consisting of SEQ ID NO:83, SEQ ID NO:84 and SEQ ID NO:85 or a subsequence thereof, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>18</sub> or the subsequence thereof can vary as set forth in Claim 46.

49. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>18</sub> or a subsequence thereof comprising at least seven amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of threonine and serine;

AA<sub>2</sub> is selected from the group consisting of histidine, aspartic acid, glutamic acid and an aliphatic,

substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>4</sub> is histidine;

AA<sub>5</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>6</sub> is selected from the group consisting of histidine, methionine, asparagine, isoleucine, leucine, valine and glutamine;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of serine and threonine;

AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>11</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>12</sub> is selected from the group consisting of phenylalanine, tyrosine and tryptophan;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of glutamine, lysine, asparagine and arginine;

AA<sub>15</sub> is selected from the group consisting of arginine, leucine, cysteine, serine, lysine, isoleucine, methionine, valine and threonine;

AA<sub>16</sub> is selected from the group consisting of glutamine, threonine, alanine, tyrosine, asparagine, serine, phenylalanine, tryptophan and glycine;

AA<sub>17</sub> is selected from the group consisting of threonine and serine; and

AA<sub>18</sub> is selected from the group consisting of leucine, valine, isoleucine and methionine.

50. The peptide of Claim 49 wherein the sequence AA<sub>1</sub> through AA<sub>18</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of an activin receptor-like kinase selected from the group consisting of SEQ ID NO:86, SEQ ID NO:87, SEQ ID NO:88, SEQ ID NO:89 and SEQ ID NO:90 or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>18</sub> or the subsequence thereof can vary as set forth in Claim 49.

51. The peptide of Claim 49 wherein the sequence AA<sub>1</sub> through AA<sub>18</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of an activin receptor-like kinase selected from the group consisting of SEQ ID NO:86, SEQ ID NO:87, SEQ ID NO:88, SEQ ID NO:89 and SEQ ID NO:90 or a subsequence thereof, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>18</sub> or the subsequence thereof can vary as set forth in Claim 49.

52. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>34</sub> or a subsequence thereof comprising at least five amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of phenylalanine, tryptophan and tyrosine;

AA<sub>2</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>4</sub> is selected from the group consisting of methionine, isoleucine, leucine and valine;

AA<sub>5</sub> is selected from the group consisting of arginine and lysine;

AA<sub>6</sub> is histidine;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of asparagine and glutamine;

AA<sub>11</sub> is selected from the group consisting of arginine and lysine;

AA<sub>12</sub> is selected from the group consisting of phenylalanine, tryptophan and tyrosine;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of arginine and lysine;

AA<sub>15</sub> is selected from the group consisting of serine, alanine, threonine and glycine;

AA<sub>16</sub> is histidine;

AA<sub>17</sub> is selected from the group consisting of glycine and alanine;

AA<sub>18</sub> is proline;

AA<sub>19</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>20</sub> is selected from the group consisting of alanine and glycine;

AA<sub>21</sub> is selected from the group consisting of lysine, valine, methionine, arginine, isoleucine and leucine;

AA<sub>22</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>23</sub> is selected from the group consisting of leucine, methionine, isoleucine and valine;

AA<sub>24</sub> is selected from the group consisting of alanine, valine, isoleucine, leucine, methionine and glycine;

AA<sub>25</sub> is selected from the group consisting of glycine, glutamic acid, aspartic acid, alanine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>26</sub> is selected from the group consisting of glycine and alanine;

AA<sub>27</sub> is selected from the group consisting of glutamic acid, asparagine, glutamine, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl,



aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>28</sub> is selected from the group consisting of aspartic acid, proline, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>29</sub> is selected from the group consisting of valine, proline, arginine, isoleucine, leucine, methionine and lysine;

AA<sub>30</sub> is selected from the group consisting of alanine, threonine, glutamine, serine, asparagine and glycine;

AA<sub>31</sub> is selected from the group consisting of proline, glutamic acid, alanine, aspartic acid, glycine and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>32</sub> is selected from the group consisting of proline, glycine and alanine;

AA<sub>33</sub> is selected from the group consisting of leucine, glutamic acid, isoleucine, methionine, valine, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid; and

AA<sub>34</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine.

53. The peptide of Claim 52 wherein the sequence AA<sub>1</sub> through AA<sub>34</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of a neurotrophic receptor kinase selected from the group consisting of SEQ ID NO:68, SEQ ID NO:69 and SEQ ID NO:70 or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>34</sub> or the subsequence thereof can vary as set forth in Claim 52.

54. The peptide of Claim 52 wherein the sequence AA<sub>1</sub> through AA<sub>18</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of a neurotrophic receptor kinase selected from the group consisting of SEQ ID NO:68, SEQ ID NO:69 and SEQ ID NO:70 or a subsequence thereof, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>31</sub> or the subsequence thereof can vary as set forth in Claim 52.

55. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>21</sub> or a subsequence thereof comprising at least five amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of threonine and serine;

AA<sub>2</sub> is histidine

AA<sub>3</sub> is selected from the group consisting of tryptophan, phenylalanine and tyrosine;

AA<sub>4</sub> is selected from the group consisting of methionine, isoleucine, leucine and methionine;

AA<sub>5</sub> is proline;

AA<sub>6</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of serine and threonine;

AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>11</sub> is selected from the group consisting of asparagine and glutamine;

AA<sub>12</sub> is selected from the group consisting of valine, isoleucine, leucine and methionine;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is histidine;

AA<sub>15</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>16</sub> is selected from the group consisting of glycine and alanine;

AA<sub>17</sub> is selected from the group consisting of threonine and serine;

AA<sub>18</sub> is selected from the group consisting of asparagine and glutamine;

AA<sub>19</sub> is selected from the group consisting of phenylalanine, tryptophan and tyrosine;

AA<sub>20</sub> is selected from the group consisting of valine, isoleucine, leucine and methionine; and

AA<sub>21</sub> is selected from the group consisting of valine, isoleucine, leucine and methionine.

56. The peptide of Claim 55 wherein the sequence AA<sub>1</sub> through AA<sub>21</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of SEQ ID NO:93 or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>21</sub> or the subsequence thereof can vary as set forth in Claim 55.

57. The peptide of Claim 55 wherein the sequence AA<sub>1</sub> through AA<sub>21</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of SEQ ID NO:93 or a subsequence thereof, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>21</sub> or the subsequence thereof can vary as set forth in Claim 55.

58. A peptide consisting of a sequence of amino acids AA<sub>1</sub> through AA<sub>22</sub> or a subsequence thereof comprising at least five amino acids, wherein:

AA<sub>1</sub> is selected from the group consisting of methionine, isoleucine, leucine and valine;

AA<sub>2</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>3</sub> is selected from the group consisting of tyrosine, phenylalanine and tryptophan;

AA<sub>4</sub> is selected from the group consisting of cysteine and serine;

AA<sub>5</sub> is selected from the group consisting of serine, glutamine, threonine and asparagine;

AA<sub>6</sub> is selected from the group consisting of glycine and alanine;

AA<sub>7</sub> is selected from the group consisting of glycine and alanine;

AA<sub>8</sub> is selected from the group consisting of aspartic acid, glutamic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>9</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>10</sub> is selected from the group consisting of arginine and lysine;

AA<sub>11</sub> is selected from the group consisting of lysine and asparagine;

AA<sub>12</sub> is selected from the group consisting of leucine, tyrosine, isoleucine, methionine, valine, phenylalanine and tryptophan;

AA<sub>13</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine;

AA<sub>14</sub> is selected from the group consisting of asparagine and glutamine;

AA<sub>15</sub> is selected from the group consisting of lysine, glutamine, arginine and asparagine;

AA<sub>16</sub> is selected from the group consisting of proline, phenylalanine, tryptophan and tyrosine;

AA<sub>17</sub> is selected from the group consisting of glutamic acid, aspartic acid and an aliphatic, substituted aliphatic, benzyl, substituted benzyl, aromatic or substituted aromatic ester of glutamic acid or aspartic acid;

AA<sub>18</sub> is selected from the group consisting of asparagine and glutamine;

AA<sub>19</sub> is selected from the group consisting of cysteine and serine;

AA<sub>20</sub> is selected from the group consisting of cysteine and serine;

AA<sub>21</sub> is selected from the group consisting of glycine and alanine; and

AA<sub>22</sub> is selected from the group consisting of leucine, isoleucine, methionine and valine.

59. The peptide of Claim 58 wherein the sequence AA<sub>1</sub> through AA<sub>22</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of an I-kappa B kinase selected from the group consisting of SEQ ID NO:79 and SEQ ID NO:80 or a subsequence thereof, with the proviso that any two amino acids in the sequence AA<sub>1</sub> through AA<sub>22</sub> or the subsequence thereof can vary as set forth in Claim 58.

60. The peptide of Claim 58 wherein the sequence AA<sub>1</sub> through AA<sub>22</sub> or a subsequence thereof corresponds to the sequence of the  $\alpha$ D region of an I-kappa B kinase selected from the group consisting of SEQ ID NO:79 and SEQ ID NO:80 or a subsequence thereof, with the proviso that any one amino acid in the sequence AA<sub>1</sub> through AA<sub>22</sub> or the subsequence thereof can vary as set forth in Claim 58.

61. A method of identifying a peptide which modulates the activity of a protein kinase comprising the steps of:

- Dependent Claim 12*
- a) providing a peptide, referred to as a "test peptide", consisting of the  $\alpha$ D region or a subsequence of the  $\alpha$ D region of said protein kinase and having from seven to about thirty amino acids or conservatively substituted functional analogs thereof;
  - b) incubating the test peptide with cells having one or more cellular activities controlled by a protein kinase under conditions suitable for assessing activity of the protein kinase;
  - c) assessing activity of the protein kinase, wherein greater or lesser activity compared with the cells grown without incubation of the test peptide indicates that the peptide modulates activity of the protein kinase.

62. The method of Claim 61, wherein the activity of the protein kinase is assessed by measuring the rate of survival or proliferation of said cells in tissue culture.

*Dependent Claim 13*

63. A method of modulating the activity of a protein kinase in a subject, comprising administering a therapeutically effective amount of a peptide consisting of the  $\alpha$ D region or a subsequence of the  $\alpha$ D region of a protein kinase, wherein:



a) said peptide has between five and about thirty amino acids or conservatively substituted functional amino acid analogs; and

b) said peptide modulates activity of the protein kinase.

64. A method of detecting a ligand that binds to the  $\alpha$ D region of a protein kinase comprising:

a) providing a peptide set forth by of the  $\alpha$ D region or a subsequence of the  $\alpha$ D region of said protein kinase, said peptide derivative having at least seven amino acids or conservatively substituted functional analogs thereof;

b) incubating said peptide with a sample, to be tested for the presence of said ligand, for a time sufficient for said ligand to bind to said peptide; and

c) detecting any said ligand-said peptide binding pair that has been formed in step b), wherein the presence of said ligand-said peptide binding pair establishes the existence of said ligand in said sample.

65. The method of Claim 64 further comprising:

d) separating said ligand from said peptide; and

e) determining the structure of said ligand, thereby identifying said ligand.

66. An antibody that immunologically binds to the  $\alpha$ D region of a protein kinase.

67. A method of producing antibodies that bind to the  $\alpha$ D region of a protein kinase comprising:

a) providing a peptide derivative of the  $\alpha$ D region of said protein kinase, said peptide derivative having at least five amino acids; and

b) producing antibodies to said peptide derivatives.

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